DEPARTMENT OF THE NAVY

NAVAL FACILITIES ENGINEERING COMMAND

DRAFT FINAL

FALL PROTECTION GUIDE/INSTRUCTIONS

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1.0 INTRODUCTION

1.1 PURPOSE:

This Fall Protection Guide/Instructions discusses the criteria for fall protection in the work place.

1.2 BACKGROUND:

Falls are the leading cause of injuries and fatalities in the work place. They are number one cause in construction and third cause in general industry. It is a duty of every employer to provide fall protection to all workers exposed to fall hazards. Fall Protection is required to protect the human assets, financial assets such as buildings and facilities, and physical assets such as machinery and equipment. Aside from tragic cost to human loss and suffering to victims and their families, workers are very expensive to retrain and to perform work efficiently. We cannot afford not to look at the human assets. It is extremely important to train, evaluate and help human assets to control the physical and financial assets. The intent of the guide is to heighten awareness to the dangers of falling, and to protect all workers exposed to fall hazards.

1.3 APPLICATION:

This guide/instructions provides information for Engineering Field Divisions, Public Works Centers, Resident Officers In Charge of Construction, Seabee Designee, Navy Crane Center Engineers/On-Site Representatives/Audit Teams, and Safety Managers, Contractor's and Subcontractor's Personnel to protect workers exposed to fall hazards.

1.4 SCOPE:

The scope of this guide is to develop a procedure designed to protect government workers and contractor's employees from falling off, onto, or through walking/working levels and to protect employees from being struck by falling objects. The guide identifies area of activities where fall protection is required. These include but not limited to ramps, runways and other walkways, excavations, hoist areas, holes, form-work and reinforcing steel, leading edge work, unprotected sides and edges, overhand bricklaying and related work, roofing work, pre-cast concrete erection, wall openings, maintenance and construction of communication towers, residential construction and other walking/working surfaces. US Army Corps of Engineers ~~COE,~~ EM-385-1-1 and ~~OSHA~~ 29 CFR 1910 and 29 CFR 1926.500, Subpart M Standards sets a uniform threshold height of 6 feet (1.8) meters where protection from falls is required for all employees.

All regulations and standards for fall protection and health safety contain the minimum requirements. "D~~O~~oD 6055.1" Instructions does not preclude D~~O~~oD components from prescribing supplementary requirements for special conditions over which the D~~O~~oD component itself, or in coordination with other Federal agencies, exercise statuary authority for safety and health matters. Generally D~~O~~oD Instructions 6055.1 does not apply to D~~O~~oD contractors, except for inspection requirements.

1.5 REGULATIONS:

- US Army Corps of Engineers, Safety and Health Requirements Manual, EM 385-1-1, ~~3 SEPTEMBER 1996~~ current edition.
- ~~OSHA~~ 29 CFR, PART 1926 Subpart M Requirement, Fall Protection Requirement in the Construction Industry;
- ~~OSHA~~ 29 CFR, Part 1910 Occupational Safety and Health Standards;
- Department of Defense Directive 6055.1, Occupational Safety and Health Program;
- ANSI Z359.1 (1992) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components;
- ANSI A10.14 (1991) Requirements for Safety Belts, Harnesses, Lanyards, and Lifelines for Construction and Demolition.

2.0 DEFINITIONS:

Anchorage: A secured structure that can safely withstands forces exerted by fall protection and rescue equipment. The structure can be in the form of a beam, girder, column or floor. Anchorage is either engineered or improvised. The anchorage must be capable of withstanding a minimum of $5,000 pounds per person.

Anchorage Connector: The means by which fall protection system is secured to the anchorage. This could be a steel cable sling, load rated eye-bolt, tripod, davit arm or any other device designed to suspend human loads and capable of withstanding forces generated by a fall.

Arresting Force: Force exerted on a worker or test weight when a fall protection system stops a fall. The amount usually expresses the peak force experienced during a fall.

Body Belt: A strap with means both for securing it about the waist and attaching it to a lanyard, lifeline or deceleration device. ~~(no longer used after 1 January 1998).~~ May only be used as a positioning device if it is rigged such that an employee cannot free fall more than 2 feet.

Body Harness: Means of configuration of connected straps to distribute fall arresting force over at least the upper thighs, waist, shoulders, chest and pelvis, with means for attaching a lanyard to other components of personnel fall arrest system.

Body Restraint System: A strap device, such as chest harness or full body harness, that can be secured around a worker and attached to a load-bearing anchorage in order to restrict travel and limit the fall hazard. The strap can be single or multiple.

Buckle: Any device for holding the body belt or body harness closed around worker's body.

Cable Grab: A fall arrest device that locks by either a cam lock (Locking arm) or inertia when a free fall is sensed. It is attached to a worker directly or by a lanyard that slides up or down a fixed cable or vertical cable lifeline.

Carabiner: An oblong ring snap-hook. Also a connector component generally comprised of an oval or trapezoidal shaped body with a closed gate or similar arrangement.

Competent Person (CP) for Fall Protection: A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment (~~OSHA~~ 29 CFR 1910.66 Appendix C). Note: The OSHA CP definition (1926.650 and 1926.32(f) also requires that a CP have the authority to take prompt corrective measures to eliminate the hazards of falling (See Qualified person for design knowledge)).

Connecting Means: A lanyard or a device used to connect a body support to an anchorage, so that it provides protected mobility for an elevated work task.

Controlled Access Zone (CAZ): Control line to restrict access to leading edge work. CAZ should run the full length of the leading edge and connect on each side to a guardrail or wall. The line is made of rope, wire or tape or equivalent material and shall be supported by posts and marked with a highly visible material.

Conventional Fall Protection Systems: Such as guardrail systems, personal fall arrest devices, or safety nets.

D-ring: A connector used integrally in a harness as an attachment element or fall arrest connection and in lanyards, energy absorbers, lifelines and anchorage connectors as an integral connector (ANSI Z359.1-1992).

Energy (Shock) Absorber: A component whose primary function is to dissipate energy and limit deceleration forces, which the system imposes on the body during fall arrest.

Fall Arrest System: A tested device and components that function together as a system to arrest a free fall and minimize the potential for compounding injury.

Fall Prevention: Any same-level means used to reasonably prevent exposure to an elevated fall hazard. Floors, walls, guardrails and area isolation are means of fall prevention.

Fall Protection: What is done to effectively address fall hazards.

Fall-Restraint System: Lanyard or device that is designed to restrain a worker in order to prevent a fall from occurring.

Horizontal Lifeline (HLL): A component consisting of a flexible line composed of a rail, rope, wire or synthetic cable installed horizontally and used for attachment of a worker's lanyard or lifeline device while moving horizontally. It is used to control dangerous pendulum-like swing fall. HLL shall be designed, installed and used under the supervision of a qualified person, which maintain a safety factor of two.

Ladder Climbing (Safety) Device: A device or climbing sleeve **connected to the front D-ring or specially designed strap on the climber's full body harness** that slides up or down a rigid rail or cable. Should the fall occur, the device is designed to lock by inertia or cam action to arrest the fall.

Lanyard: A flexible line or rope, wire rope, or strap used to secure the full body harness to a deceleration device, lifeline, or anchorage.

Leading Edge: Unprotected side and edge, means the edge of a floor, roof or formwork for a floor or other walking/working surfaces.

Lifeline (LL): A component consisting of a flexible line for connection to an anchorage at on end, to hang vertically (vertical LL), or for connection to anchorage at both ends to stretch horizontally (HLL), and which serves as a mean for connecting other components of a personal fall arrest system to the anchorage.

Personal Fall Protection System: A system used to arrest an employee in a fall from a working level. It consists of an anchorage system, connecting means, body harness, and may include a lanyard, deceleration device, or lifeline.

Positioning Belt: A single or multiple straps that can be secured around a worker's body to hold the user in a work position.

Qualified Person (QP) for Fall Protection: A person with recognized degree or professional certificate and with extensive knowledge and experience in the subject field, **who is capable of design, analysis, evaluation and specifications in the subject work**, project, or product (~~OSHA~~ 29 CFR 1910.66 Appendix C). Note: The OSHA QP definition (1926.32[1] has similar wording.)

Retracting Lifeline: See Self-Retracting Lanyard definition.

Rollout: The process by which a snap-hook or carabiner unintentionally disengages from another connector or subject to which it is coupled.

Rope Grab: A fall arrester, designed to move up or down a lifeline suspended from a fixed overhead anchorage point, to which a worker's belt or harness is attached. The rope grab device will lock onto the compatible rope.

Self-Retracting Lanyard (SRL): A deceleration device which contains a drum-wound line that may be slowly extracted from, or retracted onto, the drum. The drum-wound line is under slight tension during normal worker movement. ~~, and which,~~ After onset of a fall, the drum automatically locks ~~the drum and arrests the fall.~~ preventing the further release of line.

Shock Absorber: A component of a fall protection system that dissipates energy by creating or extending the deceleration distance.

Snap Hooks: A connector comprised of a hook-shaped body with a normally closed gate or similar arrangement which may be opened to permit the hook to receive an object and when released automatically, closes to retain the object. ~~After 1 January 1998~~ Only self locking (single or double locking) snap hooks are accepted or used, (~~OSHA~~, 29 CFR 1926.500, Subpart M).

Swing fall: A pendulum-like motion that can result from moving horizontally away from a fixed anchorage and falling. Swing falls generate the same amount of energy as a fall through the same distance vertically but with additional hazard of colliding with an obstruction or the ground.

Toe-board: A low protective barrier that will prevent the fall of materials and equipment to lower levels.

Warning Line System: ~~A~~ A barrier erected on a roof to warn workers that they are approaching an unprotected roof, side or edge and which designate an area which roofing work may take place without the use of guardrail, body harness or safety nets systems to protect workers in the area. Work outside barriers will require fall protection systems.

3.0 TRAINING REQUIREMENT

~~In accordance with 29 CFR 1926.503, every employer shall establish and provide a training program for each employee who might be exposed to fall hazards.~~

~~3.1 The training program shall enable each employee to recognize the hazards of falling in the work place and how to minimize fall hazards.~~

~~3.2 Every employee shall be trained as necessary prior to start of work, by a competent person in the following areas:~~

~~3.2.1 Nature of fall hazards~~

~~3.2.2 Fall protection systems~~

~~3.2.3 Use and operations of fall protection/prevention systems~~

~~3.2.4 Inspection of fall protection equipment by the workers~~

~~3.2.5 Role of each employee in the safety monitoring systems~~

~~5.5.1. Handling, storage and maintenance of fall protection systems~~

As per 29 CFR 1910.66 Appendix C Section III (d) thorough employee training in the selection and use of personal fall arrest systems is imperative.

5.5. Before the equipment is used, employees must be trained in the safe use of the system. This should include the following:

5.5.1. Application limits;
5.5.2. Proper anchoring and tie-off techniques;
5.5.3. Estimation of free fall distance, including determination of deceleration distance, and total fall distance to prevent striking a lower level;
5.5.4. Methods of use; and inspection and storage of the system.

5.6. Careless or improper use of the equipment can result in serious injury or death. Employers and employees should become familiar with the material in per 29 CFR 1910.66 Appendix C Section III (d) and 29 CFR 1926.503, as well as manufacturer's recommendations, before a system is used. Of uppermost importance is the reduction in strength caused by certain tie-offs (such as using knots, tying around sharp edges, etc.) and maximum permitted free fall distance. Also, to be stressed are the importance of inspections prior to use, the limitations of the equipment, and unique conditions at the worksite which may be important in determining the type of system to use. Employers should obtain comprehensive instructions from the supplier as to the system's proper use and application, including, where applicable:

5.6.1. The force measured during the sample force test;
5.6.2. The maximum elongation measured for lanyards during the force test;
5.6.3. The deceleration distance measured for deceleration devices during the force test;
5.6.4. Caution statements on critical use limitations;
5.6.5. Application limits;
5.6.6. Proper hook-up, anchoring and tie-off techniques, including the proper D-ring or other attachment point to use on the harness for fall arrest;
5.6.7. Proper climbing techniques;
5.6.8. Methods of inspection, use, cleaning, and storage; and
5.6.9. Specific lifelines which may be used. This information should be provided to employees during training.

3.3 Certification of training is required and shall be maintained at the job site for the duration of the work.

3.4 All contractors and subcontractor's personnel exposed to fall hazards shall be trained accordingly. It is highly recommended that daily tailgate meetings be conducted prior to start of work to discuss fall hazards for that day, and to remind workers to comply with the established fall protection procedures. Tailgate meetings will document the workers receiving ample training in fall protection.

3.5 All Navy personnel exposed to fall hazards shall be trained in accordance with paragraph 3.1 through 3.3 above and receive at a minimum 16 hours ~~, or as appropriate,~~ End User Training in fall protection. For Navy personnel who may be in a situation requiring climbing involving the use of a harness and dual shock absorbing lanyards, fall protection training shall include practice climbing in a controlled situation in the presence of an instructor who is experienced in fall protection training and is recognized as a competent person as defined in 29 CFR 1910 and 29 CFR 1926.

3.6 Fall protection is also required for investigations and inspection work.

3.7 All Resident Officer In Charge of Construction ROICC personnel administering construction and maintenance contracts, shall receive at a minimum 8 hours Hands-on Training in the Fall Protection systems, procedures including actual climbing in a controlled situation in the presence of an instructor who is experienced in fall protection training and recognized as a competent person as defined in 29 CFR 1910 and 29 CFR 1926, and End User Training. The ROICCs shall be able to recognize any fall hazards, deficiencies and fall risks at a construction site.

3.8 ~~At a minimum~~ ~~e~~Every Engineering Field Division, Public Works Center and Seabee Battalion shall appoint in writing an engineer to be trained in fall Protection as a qualified/competent person [40 hours, or as appropriate]. The candidate shall posses an engineering degree as a civil/structural and shall be designated from the design department, and have construction knowledge. The candidate for qualified fall protection engineer will be appointed in writing. The following are the anticipated duties of the appointed engineer:

- Design of fall protection systems, when required, including anchor systems, connecting means and body support and other fall protection systems;
- Prepare, update, review and approve fall protection plans and rescue and evacuation plans;
- Be the point of contact between the SOUTHWESTDIVISION fall protection engineer and his or her command or activity (EFDs, EFA, PWC and SEABEE);
- Aid in the investigation and inspection of fall accidents and mishaps within the EFD, EFA and PWC footprints and prepare lessons learned reports for the accidents;
- Should be knowledgeable and proficient with all fall protection regulations, products, equipment and systems,

5. FALL PROTECTION APPLICATIONS:

4.1 Climbing Communication Towers:

4.1.1 Towers Lower than 200 feet in height:

- First worker up, requires Full body harness, portable anchorage, use a self retracting lanyard (SRL) and rope grab
- After permanent anchorage secured in place, the following workers will require full body harness, SRL, vertical lifeline and rope grab
- All workers will require 100% fall protection at all times

4.1.2 Towers higher than 200 feet:

- Tower access to above 200 feet; workers can be hoisted using the Gin Pole;
- 100% fall protection at all times;
- Maximum three (3) people can ride the gin pole at the same time to gain access to the tower above 200.

4.2 Climbing Ladders:

- Use full body harness, rope grab, SRL's or vertical lifeline

4.3 Roof Work:

- On slopped roofs use full body harness, SRL, brackets to be used as anchorage points (single or multiple connections designed for 5000 pounds per person), also use lifelines;
- On flat roofs use full body harness and SRL, establish 6 feet warning line system from the leading edge or temporary guard rail.

4.4 Leading Edge Work:

- Horizontal lifeline, full body harness, SRL, roofing anchors or use Guardrail.

4.5 Scaffold Work:

- Guardrails , cross bracing with full body harness and lifelines.

4.6 Suspended Scaffolds, Work Platforms:

- Guardrails, vertical lifeline, full body harness

4.7 Aerial Lifting Equipment:

- Use full body harness, lanyards connected to guard-rails;
- Workers will require fall arrest system if the lifting equipment is positioned outside the wheel-base even if the equipment has guardrail system;
- When using scissors lift, it is highly recommended to tie off to the guardrail system using full body harness at all times.
- **Aerial lift equipment can be modified by the manufacturer to install approved anchorage connections for fall arrest system. Usually guardrails in the aerial lifting equipment are not designed to arrest a fall.**

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4.8 Confined Space Entry:

- When entering a confined area and if there is a hazard of exposure to vertical fall, the person entering such space shall be tied to a lifeline and rescue and retrieval equipment, and a co-worker should be able to retrieve the victim utilizing the retrieval mechanism without any difficulty.

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5.5. Excavated Trenches or holes more than 6 feet deep:

- Provide temporary guardrail systems on both sides of the trench or around holes or establish a warning line system. Any person crossing this line or guardrails is required to have fall protection.

6. DUTIES AND REPONSIBILITIES OF QUALIFIED AND COMPETENT PERSON:

5.1 Qualified Person (QP):

- Prepare, Review, Approve and Modify:
  Fall Protection Plans
  Rescue and Evacuation Plans;
- Design, Select, Certify, Evaluate and Analyze Fall Protection Systems and Equipment;
- Review, prepare and approve Fall Protection Plans and Specifications;
- Prepare Contract Documents for Fall Protection Systems.

5.2 Competent Person (CP):

- Implementation of:
  Fall Protection ~~Plans~~ Program
  Rescue and Evacuation Plans;
- Identify Hazardous and Dangerous Conditions in the Work Place;
- Inspection and installation of approved fall protection systems ;
- Compliance with Fall protection ~~Plans~~ Program, Rescue and Evacuation Plans;
- Training of all |workers exposed to Fall Hazards;
- Understanding and Knowledge of Fall Protection Systems and Equipment;
- Conduct Inspection/Accident Investigation;
- Have full responsibility to implement the ~~FPP/REP~~ fall protection program, and rescue and evacuation plan at work the place;
- Have only one task, to monitor the employee compliance with ~~FPP/REP~~ fall protection program, and rescue and evacuation plan.

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7. INSPECTION, MAINTENANCE, STORAGE AND CARE PROCEDURES FOR FALL PROTECTION EQUIPMENT:

As stated in 29 CFR 1910.66 Appendix C, Section I, Paragraph (f), personal fall arrest systems must be regularly inspected. Any component with any significant defect, such as cuts, tears, abrasions, mold, or undue stretching; alterations or additions which might affect its efficiency; damage due to deterioration; contact with fire, acids, or other corrosives; distorted hooks or faulty hook springs; tongues unfitted to the shoulder of buckles; loose or damaged mountings; non-functioning parts; or wearing or internal deterioration in the ropes must be withdrawn from service immediately, and should be tagged or marked

as unusable, or destroyed. **As a general rule, always consult manufacturer's recommendations for Use, Inspection, Care and Maintenance .**

6.1 Anchorage Systems:

- Inspect all components of the anchorage systems
- Observe any abrasions wear points, damaged threads or swags in the sling material before use.
- For synthetic slings, inspect all sewing and loops for wear, chemical damage, burn damage, and/or ultraviolet deterioration.
- Refer to the anchorage attached tags to determine when the sling should be retired
- Inspect cable slings for excessive damage to the steel fibers

6.2 Snap-hooks and Carabiners:

- Inspect on regular basis and before each use;
- Retire snap-hooks and carabiners and all integral components, if any discoloration, deformation, cracks or abrasions are detected;
- Retire immediately if it has sustained any fall, the spring brakes, and the gate is bent or if the gate keeper no longer engages the slot cleanly;
- Damaged snap-hook and carabiners shall be tagged and removed from service and inventory list;
- Dirty snap-hooks and carabiners shall be cleaned with kerosene, WD-40 or similar solvent, immerse in boiling water for 30 seconds to remove cleaning agent and dry with soft cloth, insure gate and gatekeeper operate properly;
- Carabiners shall not be loaded along the gate side.
- Snap-hooks shall not be side-loaded

6.3 Lanyards and Energy Absorbers:

- Inspect lanyards regularly under slight tension
- Check all components for abrasion, discoloration, cracks, and torn stitching
- Wash on regular basis to remove dirt and grit that can abrade the fibers
- Lanyards and energy absorbers shall ~~meet applicable regulations and marked as such and manufacturer's labels placed on them~~ have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, maximum elongation, maximum arresting force, maximum free fall, capacity, and that it meets OSHA & ANSI Z359.1 requirements and ANSI A10.14.
- Use and review manufacturer's log book provided with the equipment to determine the age of the lanyard and energy absorber
- Maximum usage of a lanyard shall not be more than 5 years (the time a lanyard spends stored in a sealed plastic bag out-of-the-sunlight need not be counted towards its service life); retire the lanyard**:**
    - * After a hard fall
    - * When the shock absorber has been even slightly impacted
    - * If lanyard has been used for any other purpose other than fall protection

* Shows excessive wear, chemical damage, burn damage, and/or ultraviolet deterioration.

6.4 Fall Arrester

- Inspect regularly
- Check for signs of wear, corrosion, rust and other anomalies
- If any signs of wear or malfunction, remove devise from service

6.5 Self Retracting Lifelines (SRL):

- Inspect prior to each use;
- Inspected by a competent person regularly;
- SRL shall be returned to the manufacturer for servicing and re-certification once a Year;
- If the SRL housing becomes yellow, gathers condensation, or the indicator has been engaged remove from service immediately and return it to the manufacturer.

6.6 Body Support:

- Inspect on a daily basis for frayed threads, cuts, tears or loose connections;
- Inspect the stitched areas thoroughly;
- look for burn holes from welding or other heat sources;
- Ensure harnesses are not painted or marked;
- Store harnesses in a cool dry safe environment; ideally in a locked storage area;
- Competent person shall inspect the harness periodically;
- Wash the harness in a mild soap and rinse multiple times to remove any soap residue and hang to dry out of direct sunlight in a cool dry environment;
- Maintain a log book indicating the date of entry into service, the nature of the work Performed, washing or other details;
- Retire harness from service after 5 years (the time a body harness spends stored in a sealed plastic bag out-of-the-sunlight need not be counted towards its service life).
- Shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, capacity, and that it meets OSHA & ANSI Z359.1 requirements and ANSI A10.14.

6.7 Ropes:

- Inspect Rope periodically for broken fibers, severely worn areas or change in the consistency of the core, inspect under slight tension and check for soft areas, bulges or excessive stiffness;
- Avoid exposing rope to hazardous chemicals, moisture, acids or oils;
- Don't use the rope after it is impacted or damaged;
- Wash the rope, on regular basis to remove dirt or grit, with lukewarm water and mild detergent, rinse several times to remove soap residue and hang in a dry, cool, dark area;
- Store rope in a strong weather proof bag and should always be dry prior to storage;

- Shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, capacity, and that it meets OSHA & ANSI Z359.1 requirements and ANSI A10.14.
- Retire rope after 5 years of service or if it is damaged, impacted or exposed to chemicals.

6.8 Vertical Lifelines:

- Refer to the rope section, and manufacturer's recommendations regarding inspection, care and maintenance.

6.9 Ladder Climbing Systems:

- Inspect on a regular basis;
- The sleeve should run freely without hand operations or guidance;
- Check cable and rails for abrasions, wear and cracks;
- before climbing check integrity of cable, systems and ground level.

6.10 Raising/Lowering Devices:

- Inspect visually before each use;
- Check for wear, and corrosion;
- Refer to the rope section for additional information.

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8. TIE-OFF CONSIDERATIONS

One of the most important aspects of personal fall protection systems is fully planning the system "before" it is put into use. Probably the most overlooked component is planning for suitable anchorage points. Such planning should ideally be done before the structure or building is constructed so that anchorage points can be incorporated during construction for use later for window cleaning or other building maintenance. If properly planned, these anchorage points may be used "during" construction, as well as afterwards.

8.5. Employers and employees should at all times be aware that the strength of a personal fall arrest system is based on its being attached to an anchoring system which does not significantly reduce the strength of the system (such as a properly dimensioned eye-bolt/snap-hook anchorage). Therefore, if a means of attachment is used that will reduce the strength of the system, that component should be replaced by a stronger one, but one that will also maintain the appropriate maximum arrest force characteristics.

8.6. Tie-off using a knot in a rope lanyard or lifeline (at any location) can reduce the lifeline or lanyard strength by 50 percent or more. Therefore, a stronger lanyard or lifeline should be used to compensate for the weakening effect of the knot, or the lanyard length should be reduced (or the tie-off location raised) to minimize free fall distance, or the lanyard or

lifeline should be replaced by one which has an appropriately incorporated connector to eliminate the need for a knot.

8.7. Tie-off of a rope lanyard or lifeline around an "H" or "I" beam or similar support can reduce its strength as much as 70 percent due to the cutting action of the beam edges. Therefore, use should be made of a webbing lanyard or wire core lifeline around the beam; or the lanyard or lifeline should be protected from the edge: or free fall distance should be greatly minimized.

8.8. Tie-off where the line passes over or around rough or sharp surfaces reduces strength drastically. Such a tie-off should be avoided or an alternative tie-off rigging should be used. Such alternatives may include use of a snap-hook/D-ring connection, wire rope tie-off, an effective padding of the surfaces, or an abrasion-resistance strap around or over the problem surface.

8.9. Horizontal lifelines may, depending on their geometry and angle of sag, be subjected to greater loads than the impact load imposed by an attached component. When the angle of horizontal lifeline sag is less than 30 degrees, the impact force imparted to the lifeline by an attached lanyard is greatly amplified. For example, with a sag angle of 15 degrees, the force amplification is about 2:1 and at 5 degrees sag, it is about 6:1. Depending on the angle of sag, and the line's elasticity, the strength of the horizontal lifeline and the anchorages to which it is attached should be increased a number of times over that of the lanyard. Extreme care should be taken in considering a horizontal lifeline for multiple tie-offs. The reason for this is that in multiple tie-offs to a horizontal lifeline, if one employee falls, the movement of the falling employee and the horizontal lifeline during arrest of the fall may cause other employees to also fall. Horizontal lifeline and anchorage strength should be increased for each additional employee to be tied-off. For these and other reasons, the design of systems using horizontal lifelines must only be done by qualified persons. Testing of installed lifelines and anchors prior to use is recommended.

8.10. The anchor point of a lanyard or decelaration device should, if possible, be located above the wearer’s belt or harness attachment. ANSI A10.14 also states that a suitable anchorage point is one which is located as high as possible to prevent contact with an obstruction below should the worker fall. If an object is in the worker’s **swing path**, hazardous situations exist:

8.10.1. Due to the swing, horizontal speed of the user may be high enough to cause injury when an obstacle in the swing fall path is struck by either the user or the cable..

8.10.2. The total vertical fall distance of the user may be much grater than if the user had fallen only vertically without a **swing fall path**.

8.11. Due to the significant reduction in the strength of the lifeline/lanyard (in some cases, as much as a 70 percent reduction), the sliding hitch knot should not be used for lifeline/lanyard connections except in emergency situations where no other available system is practical. The "one-and-one" sliding hitch knot should never be used because it is unreliable in stopping a fall. The "two-and-two," or "three-and-three" knot (preferable), may be used in emergency situations; however, care should be taken to limit free fall distance to a minimum because of reduced lifeline/lanyard strength.

8.12. The strength of an eye-bolt is rated along the axis of the bolt and its strength is greatly reduced if the force is applied at an angle to this axis (in the direction of shear). Also, care

should be exercised in selecting the proper diameter of the eye to avoid accidental disengagement of snap-hooks not designed to be compatible for the connection.

8.0 FALL PROTECTION ~~PLAN (FPP)~~ PROGRAM/RESCUE AND EVACUATION PLAN ~~(REP)~~:

1. As required by 29 CFR 1910.66 Appendix C, Section I Paragraph (e)(8), when personal fall arrest systems are used, the employer must assure that employees can be promptly rescued or can rescue themselves should a fall occur. The availability of rescue personnel, ladders or other rescue equipment should be evaluated. In some situations, equipment which allows employees to rescue themselves after the fall has been arrested may be desirable, such as devices which have descent capability. A qualified person shall prepare ~~the FPP/ REP~~ a Fall Protection Program, and a Rescue and Evacuation Plan. ~~,he~~ The qualified person shall also approve any changes to the requirements or updates to the plans. A Fall Protection Program is different from a Fall Protection Plan: as per 29 CFR 1926.503(k), a Fall Protection Plan is available only to employees who can demonstrate that it is infeasible or it creates greater hazard to use conventional fall protection equipment (i.e. guard rail systems, safety net systems, personal fall arrest systems.) ~~The plans~~ The Accident Prevention Plan which shall contain a copy of the Fall Protection Program and Rescue and Evacuation Plan shall be kept at the site at all times with any changes noted. The Rescue and Evacuation Plan shall contain the emergency rescue procedures for employees working at heights (i.e. employee falls and is dangling in his/her body harness)[29 CFR 1926.502(d)(20)]. If a man-basket is going to be used to rescue employees, it should be stated here. If a Navy activity is providing the man basket, a written copy of the agreement indicating this shall be contained in the Accident Prevention Plan. Any agreement between the contractor and the Naval activity needs to state when the man basket is available.

   The fall protection ~~plan~~ program shall include the following:

   8.1 Descriptions of the fall hazards in the work place
   8.2 Type of fall protection/fall prevention for every phase of the work
   8.3 Training requirements for every employee exposed to fall hazards
   8.4 The names of the qualified and competent persons shall be included in the plan
   8.5 Type of fall protection equipment and systems provided to the employees exposed to fall hazards
   8.6 In case of fall include rescue operations
   8.7 Indicate fall protection equipment and instructions for assembly/disassembly, storage, maintenance and care
   8.8 Description of warning requirements

9.0 PLANNING AND DESIGN REQUIREMENTS:

In order to plan and design a safe fall protection program, the Navy personnel as well as the contractors and subcontractors shall be trained and have the knowledge, understanding and commitment to implement a comprehensive fall protection requirements for the safety of all employees exposed to fall hazards.

Planners and designers should be striving to achieve 100% fall protection for all employees exposed to fall hazards.

With regard to the order of control measures and solutions to fall hazards and project hierarchy and desirability, the planner and the designer should consider the following order of control measures and solutions when dealing with fall hazards (FH):

- **Elimination of FH**
- **Substitution and Replacement of FH**
- **Isolation and Separation of FH**
- **Engineering Controls**
- **Administrative Controls**

9.1 American National Standard Institute (ANSI) Safety Requirements (Z359.1)

The ANSI Z359.11-1992 includes safety requirements for personal fall arrest systems, subsystems and components. The standard establishes requirements for the performance, design, markings, qualification, instruction, training, inspection use, maintenance and removal from service of connectors, full body harnesses, lanyards, energy absorbers, anchorage connectors, fall arresters, vertical lifelines and self-retracting lanyards comprising personal fall arrest systems for users within the capacity range of 130 to 310 pound weights. A standard fall protection harnesses manufactured is this country is normally rated up to 230 pounds. Before wearing a harness the employee should check the manufactures permanently attached tag for the harnesses' rated capacity. ~~Above~~ If an employee weighs in excess of ~~310~~ 230 pounds, he/she should consult with the harness manufacturer.

The ANSI Z359.1 standard addresses personal fall arrest systems incorporating full body harnesses only. Body belts are not addressed as part of ANSI Z359.1.

9.2 Design Requirements for Fall Protection:

(For other specific design criteria see other regulations and references), for additional information see Navy Guide Specification Section 01525 Safety Requirements.

*** <u>The following design information can be inserted into contracts or used by the in-house design group.</u>**

9.1.1 Fall Protection System Requirement

Each employee on a walking/working surface (horizontal and vertical) with unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by use of guard rail systems, safety nets or personal fall arrest systems. If working/walking

near or above chemicals, liquids or obstructions, fall protection systems are required, even on same level exposure.

9.1.2 Guard Rails:

- 42 inches high plus or minus 3 inches above walking/working level;
- Shall be made of top rail, mid-rails and toe boards and posts
- Top rail shall withstand a force not less than 200 pounds if applied to the top rail in outward or downward direction, midrails ahall withstand a force of 150 pounds and toe board shall withstand a force of 50 pounds;
- Top rail shall be at least 2X4 inch lumber, 1.5 inches nominal diameter schedule 40 pipe, and 2 inch by 2 inch by 3/8 inch structural steel;
- Midrails shall be at least 1X6 inch lumber
- Toeboards shall be a minimum of 3 ½ inch high

9.1.3 Stairs:

Stair-rails and Handrails:

- 36 - 37 inches (29 CFR 1926.500, Subpart M) for construction
- 30 -34 inches plus or minus 3 inches, (COE EM 385-1-1 and 29 CFR 1910)

9.1.4 Safety Nets:

- Minimum breaking strength of 5,000 pounds
- Safety net mesh opening cannot be larger than 36 square inches or longer than 6 inches on any side.
- Safety Nets must extend out from the working surface as follows;

Distance from working level to Net	**Distance Net should Extend from working surface**
Up to 5 feet	**8 feet**
Over 5 feet up to 10 feet	**10 feet**
Over 10 feet	**13 feet**

9.1.5 Personal Fall Arrest Systems:

- The system must withstand a minimum force of 5,000 pounds
- Free fall distance generally ranges between 4 - 6 feet.

9.1.5.1 Anchor Systems:

- Shall withstand a minimum force (breaking strength) of 5, 000 pounds;
- Many manufacturers require 5,400 pounds minimum anchorage strength for their equipment;
- No knots shall be tied in anchorage connectors

9.1.5.2 Snap-hooks and Carabiners

- Minimum Strength 5,000 pounds, must be self locking type

9.1.5.3 Lanyards

- Strength of 5,000 pounds
- Length: varies from 3 to 6 feet
- Synthetic rope lanyard minimum diameter is 1/2 inch
- Provide energy absorber with lanyards
- Dynamic performance test, maximum arresting force is 1,800 pounds
- No knots shall be tied in lanyards
- Must be dual shock absorber lanyards if climbing is involved (to maintain 100% tie-off at all times).
- A lanyard strap shall not be wrapped around a tie-off point and then attached back to itself, unless it is a tie-back lanyard where the lanyard straps have been designed and reinforced by the manufacturer to permit this.
- A tie-back lanyard's snap hook shall not be snapped directly back to the lanyard strap (roll-out may occur); the snap hook shall only be snapped to an attached D-ring (incorporated into the lanyard by the manufacturer).
- When using a tie-back lanyard or a separate anchorage connector strap, protect the strap from the cutting action of a beam.

9.1.5.4 Ropes

- Synthetic rope lifelines minimum strength of 5,600 pounds
- Wire rope lifeline minimum strength of 6,000 pounds
- Vertical lifelines - 5,000 pounds

9.1.5.5 Energy Absorbers:

- Shall not elongate more than 42 inches
- Maximum arresting force 1,800 pounds, minimum operating force of 450 pounds,
- Shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, maximum elongation, maximum arresting force, maximum free fall, capacity, and that it meets OSHA & ANSI Z359.1 requirements and ANSI A10.14.
- Energy absorbers must be used with the dual lanyards if climbing is involved.

9.1.5.6 Self Retracting Lanyards;

- Withstand a minimum tensile load of 5,000 pounds if free fall distance is more than 2 feet
- Withstand a minimum tensile load of 3,000 pounds if the free fall distance is 2 feet and less
- Maximum arresting force shall not exceed 1,800 pounds

9.1.5.7 Full Body Harness:

- Maximum arresting force of 1,800 pounds
- Maximum lanyard length used 6 feet, lanyard length is not applicable if it includes energy absorber
- Maximum deceleration distance 42 inches
- Shall have a permanently attached label indicating the manufacturer's name, serial number/lot number, manufacture date, capacity, and that it meets OSHA & ANSI Z359.1 requirements and ANSI A10.14.

9.1.5.8 Warning Line:

- Six feet away from a leading **edge,** and flagged every 6 feet and provide signage indicating "warning line".

Note: Horizontal lifelines are not addressed in the design requirements because they require different design for every specific application. The Horizontal lifeline has to be engineered with a safety factor of 2.

10. CONSTRUCTION OPERATIONS, DESIGN AND MAINTENANCE ACTIVITIES:

10.1 Resident Officer In Charge of Construction (ROICC):

The ROICC shall ensure all construction contracts, prior to start of construction, includes specification sections dealing with fall protection, It should be the contractor's responsibility to provide fall protection to all employees exposed to fall hazards and properly trained. The contractor shall submit a written fall protection ~~plan~~ program as part of the Accident Prevention Plan including training requirements for his employees and subcontractor's work force to the ROICC for review and approval. The ROICCs shall ensure that the contractor will not commence with any construction activities without approval of fall protection plan. **Fall protection should be one of the main topics discussed during the Pre-Construction Conference**.

10.2 In-house Design:

Navy designers shall ensure all design effort that requires fall protection, whether it is during construction phase or future maintenance phase, to have fall protection built into the design effort. The fall protection systems shall be permanently installed for future maintenance work. The designer shall identify the required location of the safe points of connection (anchor points) for future maintenance work.

10.3 Navy Design Managers:

The Navy Design Manages shall ensure that A/Es incorporate the requirements of the following:

- "Occupational Safety and Health Planning and Design Guide";
- Fall Protection is built into the design work and added to the specification sections of the contract;
- Utilize Activity Hazard Analysis system.

10.4 Maintenance Work:

The ROICCs and Navy Safety personal shall ensure that all maintenance contract work by contractors to include fall protection and to ensure the contractors comply with ~~OSHA~~ 29 CFR 1910 and 1926. The Navy maintenance Workers shall be trained on fall protection and the use of fall protection equipment if they are exposed to fall hazards

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11.0 EXAMPLES/PROBLEMS AND SOLUTIONS TO FALL HAZARDS:

The following examples/questions and solutions to fall hazards/problems are included to help the safety personal, ROICCS, contractors and subcontractors to address fall hazards issues and concerns in the work place especially during the performance of work.

11.1 Product or Material Delivery to a Construction Site:

Question: Are venders delivering products or materials to a construction site covered under 29 CFR 1926.500 Subpart M, if the products and material are delivered to a location that is 6 feet or more above lower level?

Answer: Yes, they are ~~covered under~~ required to comply with Subpart M. Venders and others are considered engaged in a construction activities when they deliver products or materials to a construction site that are used during construction activities or when they are engaged in an activity that completes the construction work, such as final cleanup of buildings and structures. If the construction contractors picked up the products or materials at the vendor's

outlet (store, warehouse, etc) the vendor ~~will not be covered by the standard~~ depending upon the type of facility may not be regulated by 29 CFR 1926.500 Subpart M.

11.2 Delivery and Placement of Roofing Materials:

Question: What are the obligations of suppliers of roofing materials when they deliver roofing materials to a construction site and place the material on the roof?

Answer: Because the products will be used during construction activities, the suppliers will be required under Subpart M to protect their employees from falls of 6 feet or more to lower levels when possible. Therefore, employees shall be provided with personal fall arrest equipment to attach to an anchor point if available. In case of <delete blank space> delivering roofing materials, the following is required:

- **Gaining Access to the Roof: When gaining access to the roof, a handhold (rope, chain or other railing) shall be attached to the conveyor belt so that the vendor or supplier's employee will have something to steady himself/herself with, or a ladder shall be used to gain access to the roof.**
- **Distribution of Roofing Materials: Once on the roof, the vendor's employee will receive roofing products from a conveyor belt (lift truck or similar equipment) and then distribute the products onto the roof at various locations. During this distribution, OSHA will not require the vendor's employees to install anchorage point for ~~FP~~ fall protection equipment regardless of the slope of the roof or the fall distance. ~~If t~~ The construction contractor ~~has~~ shall establish/point out ~~an~~ properly designed anchorages ~~available~~, and they ~~it~~ shall be used by vendor's employee.**

Additional Discussion: It is recommended that the employee be tied to an anchorage point to be established at the ridge or the highest. point on the roof. The anchorage point can have a post 4 to 5 feet high attached to it so that the self retracting lanyard or lifeline attachment to the "D" ring will be high enough and it won't become a tripping hazard.

11.3 Performing Work from Elevated Scissors Lift:

Question: When working above 6 feet high and performing work from scissors lift, does a worker require fall protection equipment, even if the scissors lift is equipped with 42" guardrails?

Answer: According to OSHA, if the scissors lift is equipped with standard guardrail on all sides, this would be in compliance ANSI A92.2 Self-Propelled

Elevating Work Platforms. However, most of the time workers performing work, while in elevated scissors lift, lean over the guardrails and perform work outreaching beyond the limits of the guardrails. Furthermore, if the scissors lift, while in motion, collides with other equipment or stops abruptly, the worker might be thrown out. Therefore, additional fall protection equipment (fall restraining equipment) will be required for the workers in a scissors lift.
Note: all other self propelled elevating work platforms like JLG will require the worker to be tied to ~~guardrails~~ a properly designed anchorage in the lift at all times. According to OSHA any self propelled elevating work platforms is positioned outside the wheelbase, ~~fall than~~ fall protection equipment ~~are~~ is required.

5.5. Fall Protection Requirement for Scaffolds:

Question: What type of fall protection equipment will be required while working on scaffolds?

Answer: Fall arrest system, vertical lifeline and guardrail system will be required on movable scaffolds. If scaffold is attached to a building or structure (stationary) workers will require fall arrest system, horizontal or vertical lifelines and guardrail system. Warning line system is required at the lower level.

5.6. Roofing Work:

Question: A roofing contractor performs new work as well as re-roofing or recovering roofing equipment. What type of fall protection is required?

Answer: When working on sloped roofs, use a horizontal lifeline with a lanyard and full body harness, or use roofing anchor brackets. If working on flat roofs use fall restraining system with full body harness and lanyard or construct temporary guardrails. On flat roofs, utilize control access zone (CAZ) to prevent workers form approaching the leading edge of the roof.

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12.0 RERERENCES:

- 29 CFR 1926.500, Subpart M, Fall Protection in the Construction Industry
- 29 CFR 1910 - Occupational Safety and Health Standards
- US Department of Labor, OSHA 3124 1993 (Revised), Stairways and Ladders
- US Department of Labor, OSHA Instruction Standards, 3.1, December 1995, Interim Fall Protection Compliance Guidelines for Residential Construction
- American National Standard, ANSI Z359.1-1992, Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
- Introduction to Fall Protection; J. Nigel Ellis, PHD., CSP, P.E., Second Edition by American Society of Safety Engineers
- Gravitec Systems Inc., Competent Person Training , Reference Manual, 1997
- Gravitec Systems Inc., Qualified Person Course Manual , 1997
- Boeing Co., Seattle WA, Fall Protection Plan

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APPENDIX "A"

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PART I. INSTRUCTIONS FOR USING FALL PROTECTION PLAN MATRIX

The following instructions/guide are included to help Navy personnel identify fall hazards in the work place and identify the recommended fall protection systems to minimize the dangers of falls:

A.1 Identification of Fall Hazards in the Work Place:

A.1.1 Fall hazards more that six-foot
A.1.2 Fall Hazards - Above a hazard at any height (e.g. above debris, machinery, structures, reinforcing bars, liquids)
A.1.3 Open Sided - [ ] Floors [ ] Platforms [ ] Stairs [ ] Catwalks [ ] Scaffolds
[ ] Machinery [ ] Other

A.2 Identify Fall Hazards in the work place

Read the first two items (1 & 2) and check the boxes that apply. If either statement is applicable, you must fill out the Fall Protection Plan Matrix;

A.2.1 Continue to read the information describing fall hazards and indicate the items that apply by placing a check mark in the appropriate box to the left of the reference number.
A.2.2 Use the reference number to find additional information in part II.
A.2.3 If a hazard exists that is not listed, write it in the "Other" box.

A.3 "Description of Fall Arrest/Restraint Methods."

A.3.1 Select the method(s) to be used from those indicated by any open circle in the intersection between section (1) and (2) (Marked "A' at the corner). Fill in the circle to indicate the method(s) that will be used and place a check mark in the appropriate box to the left of the reference number.
A.3.2 An existing **X** in the boxes indicates a required item to be used.
A.3.3 Use the reference number to find additional information in part II.
A.3.4 If a method is chosen that is not listed, write it in the "Other" box.

A.4 Inspection and Instructions for Assembly/Disassembly and storage."

A.4.1 Fill in the open circle to indicate the item to be used from those recommended in the intersection between section (2) and (3), (Marked "**B"** at the corner). Place a check mark in the appropriate box to the left of the reference number.
A.4.2 An existing **"X"** in the boxes indicates a required item to be used.
A.4.3 Use the reference number to find additional information.
A.4.4 If a method is chosen that is not listed, write it in the "Other" box.

A.5 "Warning Systems and Pass through Protection."

A.5.1 Fill in the open circle to indicate the items to be used from those recommended in the intersection between section (**4**) and (**1**) (marked "C" at the corner) then place a check mark in the appropriate box to the left of the reference number.
A.5.2 Hard hats/Hard caps **and** one other method to protect workers from falling objects must select from items: 35, 36, 39, 41, 42, 47 or an appropriate "Other" method.
A.5.3 An existing **"X"** indicates a required item to be used.
A.5.4 Use the reference numbers in part II to find additional information.
A.5.5 If a method is chosen that is not listed, write it in the "Other" box.

A.6 Emergency Rescue Plan

Include the following information as part of Emergence rescue Plan

A.6.1 Detailed location of the work site with any information that will help to find the location; Bldg. No., Floor No.; etc.
A.6.2 Detailed location of a lift that may be required for rescue. Indicate how far is the lift from the work site.

A.6.3 Location of the nearest First Aid Kit. To assure that during an emergency that there is no time lost looking for the first aid kits, post a site map marking the locations of the first aid kits.
A.6.4 In the event of an emergency rescue is required, call the phone numbers in the order that they are listed; 1st, - 2nd, -3rd. Post written directions that can be read over the phone to an ambulance driver/police/fire department or their dispatchers on how to get to the site from the main gate. Give complete information to the rescue responder.
A.6.5 Post a map at the jobsite and highlight with yellow marker the route one would take from the site to the nearest hospital that someone can use to drive an employee with minor injuries. [29 CFR 1926.50(e)]
A.6.6 Send escort to help the fire department or the rescuer find the location of the incident.
A 6.7 Post a site (building) map at the jobsite showing the locations of fire extinguishers. [29 CFR1926.150(a)(3)]

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A.7 Fall Protection Training Roster:

(Refer to section 6 of fall protection matrix)

- Before the start of a job, all workers exposed to fall hazards shall read and understand the Fall Protection ~~Plan~~ Program, and be trained in the proper use of fall protection equipment. New employee on the job shall also sign the fall protection roster form prior to start work. All subcontractors workers exposed to fall hazard shall be trained accordingly.

- If additional fall hazard requirement arise or change at the job site as the work progresses, the Fall Protection ~~Plan (FPP)~~ Program shall be reviewed and updated by a Qualified Person, and signed again by all workers exposed to fall hazards.

- The written Fall Protection Program shall be a part of the written Accident Prevention Plan which is maintained at the jobsite.

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PART II. HOW TO IDENTIFY FALL HAZARDS IN THE WORK PLACE UTILIZING WORK PLAN MATRIX

(Step by step procedure)

SECTION 1

Fall Protection Planning

In order to determine the requirement of fall protection in the work place, address the following questions:

Ref. # 1 Does a fall hazard of more than 6 feet exist?

Ref. # 2 Will work be performed above hazardous location?

a. If fall protection is required, fall protection ~~plan~~ ~~program~~ matrix should be completed.

b. After identifying fall hazards in the work place, check all the boxes that apply.

Ref # 3 [ ] Open sided, [ ] Floors, [ ] Platforms, [ ] Stairs, [ ] Roof,
[ ] Catwalks, [ ] Scaffolds, [ ] Machinery, [ ] Other.

Open sides and edges means any side or edge (except at entrances to points of access of floors, roofs, working platforms, stairs, cat-walks, scaffolds, ramps or runways where there is no wall or guardrail system at least 39 inches high.

Ref. # 4 Holes means a gap or void ~~2"~~ 2 inches or more in its least dimension, in a floor, roof, or walking/ working surface.

Opening 2 inches or more in its least dimension.
[ ] Manholes [ ] Pits, [ ] Tanks, [ ] Skylights, [ ] Open shafts,
[ ] Chutes, [ ] Other

Examples: such as a gap or opening in flooring, stairways, ramps, or roofing 2 inches or larger through which material can fall through or in the case of larger holes a person can step ~~pr~~ or fall through. In either case FP in the form of a secured and marked covering, FP, or barricading is required. Consideration shall also be given to guarding holes, which may be a trip hazard or entrapment hazard.

~~Where ever~~ whenever there is a danger of falling through skylights opening, and the skylight itself is not capable of sustaining the weight of a two hundred pound person with a safety factor of four, standard guard rails shall be provided on all exposed sides or the skylight shall be covered with a cover.

Ref. # 5 Wall opening - at least 30" high by 18" wide in a wall or partition, through which person may fall to a lower level.

This must be considered any time work is being performed near a wall opening and window opening with a fall hazard to a lower level.

Ref. # 6 Working in a boom supported articulating lift; e.g. Lift-a-Loft

Before each elevation of the work platform, the operator will check to see that all occupants' full body harnesses are on and properly attached.

Ref. # 7 Leaving the floor surface of a:
[ ] Lift, [ ] Catwalk, [ ] Platform
[ ] Scaffold, [ ] Elevating work platform, [ ] Stairway, [ ] Other

Whenever an employee leaves the floor of any of the above, thereby, reducing the height of the top rail to less than 42" plus or minus 3", in relation to the employee, FP must be utilized.
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Ref. # 8 Working above suspended ceilings

A ~~FP plan~~ fall protection program is required for working above suspended ceilings. Fall arrest or restrain systems must be used.

Ref. #9 Leading edge work above 6 feet on a less than 4/12 pitch (low-pitched roof).

Leading edge means the advancing edge of a floor, roof, or form-work which changes location as additional floor, roof, or form-work sections are placed, formed, or constructed. Leading edges not actively under construction are considered to be "unprotected sides and edges. Positive methods of fall arrest or fall restraint shall be required to protect exposed workers to hazards of falls. Positive methods of fall arrest or fall restrained shall be required for persons conducting inspection or surveying existing roofs.

Ref. # 10 Working within 6 feet of an unguarded roof edges less than 4/12 pitch.

During the performance of work on low-pitched roofs with a potential fall hazard greater than 6 feet, the FP plan shall ensure that employees engaged in such work are protected from falling from all unprotected and edges of the roof as follows:

a. By using fall restraint or fall arrest systems.
b. By the use of a warning line system.
c. Mechanical equipment shall be used or stored only in areas where employees are protected by a warning line system, or fall restraint, or fall arrest systems
d. Exceptions.

(1) The provisions of this section do not apply at points of access such as stairways, ladders and ramps, or when employees are on the roof performing inspection or investigation work, or estimating roof level conditions. Roof edge materials handling areas and materials storage shall be guarded.

(2) Workers engaged in built-up-roofing on low-pitched roofs less than 50 feet wide, may elect to utilize a safety monitor system without warning lines where the use of hot tar poses an additional hazard to workers.

Ref. # 11 Steep Roof (greater than a 4/12 pitch)

~~FP~~ Fall protection or restraint system shall be used when working on steep roof. Warning line and safety monitor system are prohibited on surfaces exceeding a 4 in 12 pitch, and on any surface whose dimensions are less than 45 inches in all directions.

Ref. # 12 Elevating work platforms (e.g. scissors lifts)

When working from elevated work-platforms 6 feet or higher, elevating work platforms must be equipped with standard guard rail and toe boards. If the worker's feet leave the floor of the elevating work platform or the worker will be required to exit the lift, at height, a ~~FPP~~ fall protection program must be completed and continuous ~~FP~~ fall protection must be provided. Workers shall be provided with fall arrest system if the lifting equipment is positioned outside the wheel base, even if the equipment has guardrail. It is highly recommended to tie off in scissors lift even if the platform does not move away from the base.

Ref. # 13 Boatswain Chair

The term "boatswain chair" shall mean a seat to support a worker in a sitting position, supported by rope slings attached to a suspension rope.
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Ref. # 14 Working on roofs when the possibility of adverse weather conditions may be present, such as wind, ice, or rain.

When the possibility of adverse weather conditions exist, extra caution must be exercised. safety manager must be consulted where the work is occurring, duration of work, number of employees, and who to contact in case of adverse weather.

Ref. # 15 Other:

Write in any fall hazard identified during site inspection that is not listed above. Be as specific as possible. Describe fall arrest/restrained method. Fill in the open circles that apply and check the appropriate boxes to the left of reference box under section 2.

SECTION 2

Description of Fall Arrest/restraint methods

Ref. # 16 Guard Rails (Temporary)

Standard ~~G~~guard railing, ~~T~~temporary or permanent, shall consist of top rail, intermediate rail, toe-board, and posts, and shall have vertical height of 42" plus or minus 3" from the upper surface of top rail to floor, platform runway, or ramp level. The posts and framing members for railings of all types shall be capable of withstanding a load of 200 pounds applied in any outward or downward direction at any point along the top edge and with minimum defection (~~OSHA~~ 29 CFR, 1926.502). In any case, the top edge of the guardrail shall not deflect to a height less than 39 inches above the walking working surfaces and with minimum of deflection.

Ref. # 17 Warning Line System

Warning line system means a barrier erected on a walking and working surface or a low pitch roof (4 in 12 or less), to warn workers that they are approaching an unprotected fall hazard(s).

Warning line system must be erected around all sides of the work area. Where mechanical equipment is not being used, the warning line shall be erected not less than six (6) feet from the edge of the roof. When mechanical equipment is not being used, the warning line shall be erected no less than six feet from the roof edge, which is parallel to the direction of mechanical equipment operation. It shall not less than 10 feet from the roof edge, which is perpendicular to the direction of mechanical equipment operation.

Ref. # 18 Catch Platform/safety Nets

A substantial catch platform shall be installed below the working area of roofs more than 20 feet from the ground to eaves with a slope greater than 3 inches in 12 inches without a parapet. In width the platform shall extend 2 feet beyond the projection of the eaves and shall be provided with a safety rail, mid rail and toe-board. This provision shall not apply where workers engaged in work upon such roofs are protected by a harness attached to a lifeline.

Where work is in progress above workers, a catch platform or other means shall be provided to protect those working below. all workers shall be notified. One completed floor shall be maintained between workers and steel or concrete work above.

Ref. # 19 Vertical Lifeline/Rope Grab

Vertical lifeline means a vertical line from a fixed anchorage independent of the walking/working surface to which a lanyard or device is attached

Rope grab means a fall arrester designed to move up or down a lifeline, to which the harness is attached. For additional requirements refer to the definition section.

Only one person shall be attached to a vertical lifeline. Two workers will require two independent vertical lifelines.

Ref. # 20 Horizontal Lifeline

Horizontal lifeline - (Catenary line, static line) means a rail, rope, wire, or synthetic cable that is installed in a horizontal plane between two anchorage's and used for attachments of a worker's lanyard or lifeline device while moving horizontally; used to control dangerous pendulum-like swing falls**. A qualified person** must design the system. The competent person will review and approve the installation only.

Ref. # 21 Fall Arrest ~~(rig)~~ System

Fall arrest protection consists of:
(a) Full body harness, approved lanyard, and an approved anchor point. **Full Body Harness** shall be approved by ANSI Z359.1. **Lanyard** shall be a shock absorbing type lanyard (2, 4 or 6 feet long depending on the application). **Anchor Point** shall be capable of supporting 5000 pounds per employee or 3000 pounds per employee if a self-retracting lifeline is used or a shock-absorbing lanyard is used. Anchor point shall be approved by a qualified Person". (see definition).

Note: Use only full body harness. ~~After 1 January 1998' b~~ Body belts are not allowed.

(b) Safety Nets.

Safety nets shall be installed as close as practical under the walking/working surface on which employees are working, but in no case more than 30 feet. Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical Distance from Working Level to Horizontal plane of net	Minimum required Horizontal distance of outer edge of net from the edge of working system
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet

(c) Catch Platforms

(1) A catch platform shall be installed within 6 vertical feet of the work area.

(2) The catch platforms width shall equal the distance of the fall but shall be a minimum of 45 inches wide and shall be equipped with standard guard rail on all open sides.

Ref. # 22 Fall Restraint ~~(rig)~~ System

Fall restraint protection shall consist of:

(a) Standard guardrail (42 ' +/- 3" high)
(b) Harness attached to securely rigged restraint lines.
(c) Safety Harness (full body harness)

(d) Rope grab devices are prohibited for fall restraint applications unless they are part of a fall restraint system designed specifically for the purpose by the manufacturer's recommendations and instructions.
(e) Anchorage points used for fall restraint shall be capable of supporting 4 times the intended load. (minimum 800 pounds).
(f) Restraint protection shall be rigged to allow the movement of employees only as far as the sides and edges of the walking/working surfaces and so that they cannot not fall more than 2 feet.

Ref. # 23 Egress Fall Protection

When ever employees are required to move from one elevated area to another that presents a fall hazard of 6 feet or greater, positive ~~FP~~ fall protection ~~will~~ shall be provided. An example of this is utilizing a scissors lift to gain access to a roof or intermediate platform. The employee must be protected when existing the scissors lift. This can be accomplished by using a double lanyard or a "Y" lanyard. At no time ~~will~~ shall a worker be exposed to fall hazard. When exposed to fall hazards 100% fall protection is required at all times

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Ref. # 24 Safety Monitor System (Competent Person)

A safety monitor system (SMS) may be used in conjunction with a warning line system as a method of guarding against falls during work on low pitched roofs and leading edge work only. The safety monitor system is used, only after evaluation it is shown that the use of other systems are nor feasible or create a greater hazard. The SMS shall not be used when weather conditions create additional hazards.

A person acting in the capacity of SMS shall be trained in the function of both the safety monitor and warning lines systems, and shall:
(a) Have control authority over the work as it relates to fall protection.
(b) Be instantly distinguishable ~~over~~ from members of the work crew. (distinguishable markings or a different colored high visibility vest).
(c) Engage in no other duties while acting as safety monitor.
(d) Be positioned in relation to the workers under their protection, so as to have a clear, unobstructed view and be able to maintain normal voice communication.
(e) Not supervise more than eight exposed workers at one time. Control zone workers shall be distinguished from other members of the crew by wearing a high visibility vest only while in the control zone.

Ref. # 25 Floor/Hole Covers (Temporary)

Trenches, and manhole covers and other appurtenances, when located in a roadway, and vehicular aisles shall be designed to carry twice the maximum axle load of the largest vehicle expected to cross over.

All floor-opening covers shall be capable of supporting the maximum potential load but never less than two hundred pounds (with a ~~safety~~ design factor of 2). The cover shall be the same level of the rest of floor and it shall be securely fastened to the floor to prevent accidental removal. All covers shall be color-coded or they shall be marked with the word "Hole" or "Cover" to provide warning of the hazard. If it becomes necessary to remove a cover, provide conventional fall protection system around the opening until the cover is replaced.

Ref. # 26 Other

List any other specific fall protection system that will be used on a project.

SECTION 3

Inspections, and instructions for assembly/disassembly and storage.

Fill in the open ~~box ,~~ box, circles that apply and check the appropriate boxes to the left of the reference boxes.

Ref. #27 Inspect all Fall Protection/restraint Equipment prior to every use.

All equipment must be inspected per the manufacturer's instruction. Operator's Manual shall be included with the equipment the for employee's reference. Also follow all instructions of the "Qualified Person" prior to using the equipment.

Ref. # 28 Contact Qualified/competent Person for Anchor Points loading selection and approval.

Due to the variability in the structural strength of different materials prior to using an anchorage point, a qualified person must be contacted to ensure that the anchorage point meets/exceeds regulatory requirements.

Ref. # 29 Protect against cuts and abrasions.

All safety lines and lanyards shall be protected against being cut or abraded. Padding must be used wherever sharp edges exist.

Ref. # 30 Stored in an approved location

All fall protection/restraint equipment shall be stored in a weatherproof container or locker when not in use. Equipment should not be allowed to lay in water or direct sunlight, since this will affect the strength of the equipment.

Ref. # 31 Shall be Engineered/Compatible System

Contact Qualified person or manufacturer's representative for assistance. When using FP systems all components shall be designed for use with each other, or approval must be obtained from the Manufacturer or Qualified Person to use the configuration. All system components shall be compatible.

Ref. # 32 Follow Manufacturer's and the Qualified Person's Instructions for Installation, Assembly/Disassembly and Use.

All systems must be installed, assembled, disassembled per the Manufacturer's direction. Failure to follow these instructions could lead to the possible failure of a system.

Ref. # 33 In the event of a fall; secure all equipment involved and contact Safety for disposition - "Do not reuse"

In the event of a fall the first response is to ensure the safety of the employees. After rescue and, if required, medical aid is provided, all equipment involved must be removed from service. Safety must be contacted.

Ref. # 34 Other

Use this space to list other special identified instructions.

SECTION 4

Warning Systems and Pass Through Protection.

Fill in the open circles that apply and check the appropriate boxes to the left of the reference numbers.

Ref. # 35 Barricade Area

All areas must be barricaded to safe guard employees. When working overhead the area below the work must be barricaded to prevent entry by unauthorized employees. A distance of 6 feet shall be barricaded around the worker.

Ref. # 36 Warning Tapes/Signs

Construction warning tape and signs shall be posted so as to be clearly visible from all possible access points. When sign is used it should clearly indicate the entry requirements, potential hazards, and personal protective equipment requirement.
<delete blank line>

Ref. # 37 Hard Hat/Hard Cap Requirements

Hard Hats/Hard Caps complying with ANSI Z89.1, 1997 Type I, Class E & G will be required when exposed to falling/flying objects. ~~f~~Furthermore, select one additional measure:

[ ] Barricades [ ] Canopy Structure [ ] Toe Boards

Hard hats/Hard caps must be worn any time that employees are working below other employees and/or the potential exist for falling objects to strike the employees working below. In addition to hard hats one additional preventive measure must be implemented.

As an example, when using hard hats/hard caps, the employee must use additional form of protection from falling objects such as: barricading the area, protective canopy structures, or platforms with toe boards.
<delete blank lines>

Ref. # 38 Clothing and Safety Shoes

Suitable clothing shall be worn. Sufficient and proper clothing shall be worn to assist in preventing scratches, abrasions, slivers, sunburn, or similar hazards. Loose or ragged clothing or ties shall not be worn while working around moving machinery. At a minimum, employee must wear short sleeve shirt, and long pants.

Substantial footwear, made of leather or other equally firm material, shall be worn by employees whenever there is a danger of injury to the feet through falling or moving objects, or from burning, cutting, penetration, or similar hazard. The soles and heels of such footwear shall be of a material that will not create a slipping hazard. Footwear that has deteriorated to the point where it does not provide the required protection shall not be used.

Ref. # 39 Evacuate Area Below

All non-essential personnel below a construction area must be cleared or protection provided.

Ref. # 40 Secure Stored Material

All construction materials and equipment stored on a roof or other exposed areas must be secured against inclement weather conditions. Prior to end of the workday all loose materials must be secured to prevent injury or property damage from lowing or falling objects. Caution must also be taken so as not to overload the roof. Materials shall not be stored within 6 feet of the edge of the roof unless guardrails are erected on the roof edge.

Ref. # 41 Traffic Control

When working over or adjacent to a roadway, traffic control measures must be developed. Employee working adjacent to roadways must wear vests that are highly visible and have reflective markings. When working adjacent to transportation aisles traffic control measures should be reviewed to ensure the safety of the personnel on the job site.

Ref. # 42 Control Falling Objects

When employees are working over other employees all tools and equipment will be secured so as they will not fall. Tethers should be used to tie off tools and equipment. Employee must wear hard hats whenever there is a potential for falling objects. (see reference #37) Toeboards and solid floor surface without openings ~~for objects to fall through should~~ shall be provided to prevent objects from falling through.

Ref. # 43 Debris Control

Measures shall be taken to control debris in the construction area. Debris shall not be allowed to accumulate on walking/working surfaces.

Ref. # 44 Safety Monitoring on the floor or radio communication recommended

Whenever working on a roof, lift or other area where potential for fall exists a safety monitor or two-way radio communication is required.
<delete blank line>

Ref. # 45 ~~Contact Safety~~ Safety Communications

Establish/maintain contact/communications with your activity Safety Manager ~~Contact safety~~ or competent person whenever roof top work is being performed and the possibility of adverse weather conditions exist.

Ref. # 46 Perform Fall Protection Equipment Inspection

All fall protection equipment ~~must~~ shall be inspected each day prior to use.

Ref. # 47 Canopy

A covering that is erected to provide protection from falling or flying objects. The canopy must be designed and constructed to withstand the force of all potential falling objects and approved by a Qualified Person before it is erected or put into use.

Ref. # 48 Lock-out/Tag-Out/Try-out

When working in the vicinity of energy sources lock-tag/try-out must be used to eliminate any potential hazards.
<delete blank line>

Ref. # 49 Crane Rail Stops

Any time that work will be done within an overhead crane/WHE system, crane rail stops will be used to isolate the work area and prevent collisions between employees at height, and cranes and other overhead weight handling equipment.

Ref. # 50 Other

Note any other pass through protection measures or other protective measurers taken.

SECTION 5:

Emergency Rescue Plan

(See form 1-1)

The emergency Rescue plan shall include the following:

5.1 Detailed location of the work site with any information that will help find the site, building number, etc. Post written directions that can be read over the phone to an ambulance driver/police/fire department or their dispatchers on how to get to the site from the main gate. Post a map at the jobsite and highlight with yellow marker the route one would take from the site to the nearest hospital that someone can use to drive an employee with minor injuries. [29 CFR 1926.50(e)]
5.2 Indicate location of the lift or other equipment that will be used in case of emergency and the location of the key.
5.3 Location of the closest first aids kit. To assure that during an emergency that there is no time lost looking for the first aid kits, post a site map marking the locations of the first aid kits.
5.4 Listing of emergency phone numbers
5.5. Post a site (building) map at the jobsite showing the locations of fire extinguishers. [29 CFR1926.150(a)(3)]

<delete blank lines>

SECTION 6:

Fall Protection ~~Plan~~ Program Training and Roster

(See form 1-2)

Prior to start of work, all workers exposed to fall hazards must sign a Fall Protection Program form acknowledging that the employee has been trained in the job hazard recognition, training has been received for proper use of the selected fall protection equipment and methods to overcome the hazards. All employees (workers) newly assigned to the job must also review the ~~FPP~~ written Fall Protection Program and sign the roster. If the fall hazards, fall protection equipment, or methods change during the course of the job, the ~~plan~~ program must be reviewed and signed again by all employees working on the job site.

SECTION 7:

Review and Approval and Implementation

A Qualified person is required to fill out and sign the ~~FPP~~ Fall Protection Program. A Competent Person can fill the ~~FPP~~ Fall Protection Program if he or she has the proper training to prepare the ~~plan~~ program. The competent person will be working under the jurisdiction of the **Qualified Person** who shall review, approve and sign the ~~FPP~~ Fall Protection Program prepared by the Competent Person. The qualified person will provide instructions and approve the selected equipment and procedures when applicable.

A Competent Person will be the responsible person to see that the ~~FPP~~ Fall Protection Program is implemented during the course of the job and will provide ~~FP~~ fall protection training for the workers. The competent person shall have the full responsibility to implement the ~~FPP~~ Fall Protection Program and should have only one task to monitor the employee's compliance with ~~FPP~~ Fall Protection Program requirements.

All employees working at heights at the job site must understand and agree to use the ~~plan~~ program.

SECTION 8:

Posting and Filling Instructions

The ~~FPP~~ Fall Protection Program must be readily available for the duration of the job and must be posted at the job site. All training forms for the employees, training on fall protection shall be maintained for the duration of the work and kept ~~near~~ at the work ~~site the same health and safety plan~~ as part of the Accident Prevention Plan.

EMERGENCY RESCUE PLAN Form

Site & Location Identification:

Detailed Location:

Primary Emergency Phone Number:

Type of Phone/Location:

Local Phone Line/Outside Line:

Secondary Emergency Phone Number:

Backup Rescue Lift is Available/Located at:

First Aid kit Location(s):

Fire Extinguisher Location(s):

Nearest Hospital Route and Location:

Describe Rescue Operation:

Type of equipment (PPE, Ladder, Hoist, etc.)

Training on Rescue:

Name of Personnel Requiring Rescue:
Additional Comments: _____
_____
_____
_____
_____

FORM 1-1

FALL PROTECTION TRAINING ROSTER (FORM)

All employees signing this form shall indicate that they understand the fall hazards on the job site and they have been trained in the proper use of and will use the selected fall protection equipment and methods. Review and sign again if hazards or methods change.

NAME: _____
ORGANIZATION/CODE/SHOP: _____
SIGNATURE: _____
TRAINING DATE(s): _____
DURATION OF TRAINING (Hrs): _____
INSTRUCTURE'S NAME: _____
COURCE TITLE: _____
DESCRIPTION OF THE COURCE: _____

NAME: ____
ORGANIZATION/CODE/SHOP: ____________________________
SIGNATURE: ______________________________________
TRAINING DATE(s): __________________________________
DURATION OF TRAINING (Hrs): ____________________________
INSTRUCTURE'S NAME: ________________________________
COURCE TITLE: ______________________________________
DESCRIPTION OF THE COURCE: ____________________________

NAME: ____
ORGANIZATION/CODE/SHOP: ____________________________
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ORGANIZATION/CODE/SHOP: ____________________________
SIGNATURE: ______________________________________
TRAINING DATE(s): __________________________________
DURATION OF TRAINING (Hrs): ____________________________
INSTRUCTURE'S NAME: ________________________________
COURCE TITLE: ______________________________________
DESCRIPTION OF THE COURCE: ____________________________

FORM 1-2